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Construction and Management for the Island Live-work Settlement

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Abstract: Based on the "live-work" island residential functional development, after elaborating and making comparison between evolutionary agents for island settlement Chinese and Western, the paper analyzes the residential construction and explores the paradigms of mixed house type based on island industrial characteristics withdifferent construction types as representatives. By centering on the operational characteristics of island mixed-used settlement, the author starts from such perspectives as synergy, elasticity and performance and then simulates its industrial and residential benefits before further promoting the residential paradigm development of "live-work integration" by controlling infrastructure, heterogeneous space and management mechanism, hence providing example and reference for the mixed residential development in other islands domestic and overseas.

Key words: Live-work, island settlement, stereotype, construction, management

INTRODUCTION

Island residential unit combination is the settlement constructed in islands by island residents under the constraints of such natural conditions as climate and geography based on their survival and development. With the development of island economy its construction purpose has not just been restricted in providing residential function. Depending on the classification of regional production mode, traditional residential houses have gradually evolved into the family production workshop in such live-work mixed models as farmhouse type, industrial type, artistic type, market type and religious type and they have also further formed the island residential construction with local features and mixed function in addition to the rise of emerging industries. Meanwhile, due to such characteristics as functional diversity, spatial systematicness and matching elasticity as well as model generality, heterogeneous functional house type has been employed a lot by the residents. By contrast, studies in this aspect lag behind those in land and even it is still blank in many fields. Besides it is also lacking of the supports from clear theoretic systems, especially lots of blind spots in management system under overall development and construction model; therefore, this causes a series of problems such as conflicts in mixed function, unbalance in spatial system and low degree of modernization. As a result, aimed at the construction and management based on the mixed functional system it will serve as the critical point for improving island settlement.

AGENTS FOR ISLAND MIXED-USED SETTLEMENT

In the forming process, the overall island residential pattern possesses some organizational disciplines and characteristics. For one thing, ocean culture, industrial orientation and spatial characteristics reflect the "up-bottom" management mechanism; for another, economic factors, family traditions and community relationships take on the "bottom-up" heterogeneous energy (Roger, 2008). As the concept of mixed function takes root in islands Chinese and Western, the live-work production residential mode is the inevitable outcome of island settlement (Table 1).

Demand of functional integration: Supported by tourism and under the needs in industrial integration and guidance of ecological respect, Bali Island has gradually formed the holiday leisure settlement with low layers and high density. The tendency of tourism industry to maximization and the marketization of human landscape determines the isomerism between its residential construction and other islands with fishery and agriculture as the main industrial support in space, system and mode. Similarly withtourism as its main industry, Maldive Islands develop the Maldive mixed mode with "three lows and one high", namely, low-rise buildings, low-density exploitation, low-capacity utilization and high afforestation rate (Wu, 2006).

Limitation of natural environment: Out of fear for pirates, Santorin Island in Greek builds most of the

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Table 1: Comparison of agents for island mixed-used settlement

Comparison	South Asian area	Mediterranean	Chinese area
Typical example	Bali Island (Maldive)	Santorin (Sicily)	Zhoushan Islands
Live-work type	Tourism-living type	Culture-living type	Trade-living type
Natural resources	1. Rich tourism resources; 2. Religious art and artistic style	1. Tourism resource of volcano landscape 2. Lost Atlantis Civilization	1. Port coastal resources 2. More stones, less wood withshortage of refresh water
System background	1. Investor enthusiasm; 2. Governmental regulations in 1971; 3. Ecological concept and orderly development	1.Pirates robbed; 2. The governmental height limit control on monolithic island architecture	1. The nation approves of establishing Zhoushan New District; 2. The "multiple product in an island" model
Functional mechanism	The combination of material and cultural resources to improve construction image	Mainly for self-sufficient agricultural products and artistic industry	Overseatrade, southeastlogistics and commercial trade transportation
Generating scheme	Differentiation among high, middle and low consumer groups	Arrangement along with isoheight and roads interposed therein	Transformation from traditional settlements and being concentrated and compact
Existing problems	Security problem;Traffic problem	Steep terrain; urban modernization	Natural disasters; Imperfect management

mixed-used settlements on the cliffs far from the ocean. Meanwhile, due to the wretched natural conditions, residential construction needs to possess such functions as being wind-proof in winter and sun-sheltering in summer as well as defending aggression apart from satisfying the production and living needs. Therefore, the mixed functional building units with rough appearances are formed (Li, 2008). Its basic industrial mode covers agriculture and handicraft industry which serve the living function of island residents and weaken the negative impacts brought by steep terrain and inconvenient traffic.

Impact of new industry: As Zhoushan Islands are located in Yangtze River Delta Region of China withthe development of its oversea trade, the traditional pattern of natural economy there has been broken and the residential paradigm has gradually developed into three main mixed functional construction types, namely, happy fishermen, farmhouse and merchant house from traditional residential system (Zhu, 2009). On the other hand, the scale of tourism industry in the island gradually enlarges and such contents have become the new industries for residents there to replace traditional survival and operation mode as Buddhist culture, marine art and seafood cuisine. Under this impact, various residential carriers with operating industries are generated all the more.

ANALYSIS OF ISLAND MIXED-USED SETTLEMENT PATTERNS

According to the classification of basic human activities, settlement functions can be generalized into the mixture of three elements, namely, industry, residence and auxiliary. And the diversity of industrial residential function formed and organized from these three elements is the main characteristics of island settlement. Based on this and grounded on different types of industries in mixed-used settlement, the paradigm of island settlement can be classified into five types: Farmhouse type, industrial type, artistic type, market type and religious type.

Farmhouse island settlement: "Farmhouse type" island mixed-uesd settlement is the live-work construction mixed with agricultural production and residential function. As farmhouse residence is limited to internal living place factor and external market economy factor in the initial stage, the spatial utility provided by it is very restricted. In order to seek the balance of living space utility and satisfy the live-work mixed demands of farmhouse, the residential construction with mixed function comes into being accordingly. In the orderly transitional stage of "farmhouse type", according to differences in spatial distribution form, 6 major types are generated, namely, regular type, stochastic pattern, gathering type, linear type, low-density and high-density type. Meanwhile, other derivative industries such as island handicraft, happy fishermen and animal husbandry are also formed apart from island planting industry (Qiao, 2011).

Industrial island settlement: With the gradual development of island economy, the increasingly frequent industrial activities cause changes in lifestyle of island residents; furthermore, the living environment developed originally from the rise of agriculture makes conflicts with

people's life wills. After that, the "industrial type" residential settlement gradually replaces it with the irreplaceable advantage of integrating residence, life and work together. At the same time, to realize the complementation between different resources like capital, market and labor, the industrial settlement generally possesses the characteristic of spatial gathering; therefore, residential function is combined with production benefits which easily and directly satisfies the most direct demands of residential construction with mixed function.

Artistic island settlement: "Artistic type" island mixed model is the residential model combining island artistic industry and residential function. Its purpose and objective is very clear: for one thing it hopes to form the common creation bases for artisans through artistic residence gathering; for another it is aimed at providing chance and space for the inheritance and diffusion of artistic industry as the functional carrier of life residence. Influenced by three behavioral efficacies such as island cultural control, retardation and permeation and accompanied with external material and non-material cultural impacts it derives the cultural settlement with multiple centers and in discrete type. The construction function of island artistic village also creates other cultural and artistic activities as fishermen painting show, island planning seminar and folk song and ballad festival apart from artisans' life and work, thus improving the humanistic quality of island.

Market island settlement: "Market type" island mixed model is the construction model mixed with residence and industrial function, such as island inn, catering industry, retail and leisure recreation developed on the basis of island tourism resources. The reasons for its birth are mainly the gradually growth of island tourism industry, the increasingly perfect commercial market environment and diversified social economic structure. According to the forming type of its heterogeneous function, market type island residential mode can be divided into: □ The type with market in front and residence in back .□The type with market at top and residence at bottom.□ The integrated type with market and residence. (Xia, 2010).

Religious island settlement: Island religious plays positive role in stabilizing island residents' life and promoting the harmonious coexistence between island settlement and nature; moreover it permeates in island settlement from multiple aspects, such as residents' life mentality, material culture and thinking ideas. Firstly, island residents often collect money in the settlement to build large and gorgeous religious buildings because of religious belief, such as "Guanyin Temple" and "Tianhou Temple" in Zhoushan. Secondly, in the treatment of heterogeneous function, as the religious function is characterized by loftiness its spatial shape and structure are often existed in mixed functional residences with the form of centralized type, top type and symmetric type. Thirdly, in handling details of island settlement, the door walls at the entrance to these buildings are often engraved with the curly grain of honeysuckle, in order to display the indomitable willpower.

WORK-LIVE ORGANIZATION CHARACTERISTICS

In the development process of island mixed-uesd settlement, various life and production spaces are constructed and they are mutually intersected and superimposed. Although the basic construction concept has been established, yet the demonstrative system of its standardization has not yet been formed. Therefore it is the key point for improving island settlement to make the development orientation of mixed function clear and correctly handle the harmonious relationship between function and space.

Diversity function: The diversified island development model promotes the development and changes of mixed pattern but, the traditional island production mode with strong embeddedness such as fishery and agriculture are not totally eliminated under the impact of new production modes like tourism and commerce; instead, they become interdependent. The industrial diversity actually offers more chances for residence development; therefore, the "three multiples" construction model with multiple centers, multiple functions and multiple benefits is generated accordingly. However, limited by the shortage of innovation, conservative thinking and imperfect system, the interweaving mode with multiple industries frequently takes on the disorderly economic status with low efficiency and without features which is far lower than the benefits brought by island residential settlement with single industrial brand feature (Table 2).

Live-work synergy: In island residential construction, there is synergy effect between production function and living function, in other words, to generate the higher spatial values compared with single function. The synergy effect mainly covers: □ frontal support: The effect produced by it is very direct, such as the self-sufficiency in island fishery and agriculture, the dining convenience provided by the catering industry and the like; □ lateral support: Its effect interacts from other aspects, such as the promotion in residential quality

Table 2: Type of island mixed-uesd residential paradigm

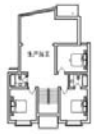
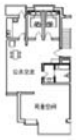
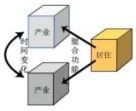
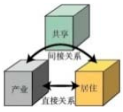
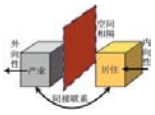
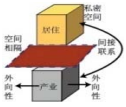
Paradigm	Traditional house	Farmhouse mixed type	Industrial mixed type	Artistic mixed type	Market mixed type	Religious mixed type
Main function	Living for life	Agricultural processing	Industrial production	Artistic creation	Foreign trade	Religious worship
Settlement sample	Zhoushan traditional residence	Yugang Village in Shenjiamen	Xingang Industrial Park	Yudou Ancient Art Center	Dongsha Happy Fishermen	Beimen District, Dinghai
Plane paradigm						

Table 3: Synergy mechanism of heterogeneous space

Heterogeneous mechanism	Timeliness mixed type	Sharing mixed type	Horizontality mixed type	Verticality mixed type
Unit sample	agriculture	Hotel	Industrial/artistic	Commercial
Mixed characteristics	Functional adjustment	Functional division attenuation	Clear functional division, improving industrial benefits and living quality	
Pattern model				

brought by island artistic industry, residential improvement brought by hotel operation and etc. By contrast, there are also potential contradictions existing in dynamic demands of production space and static demands of living space which mainly reflect in: □ the contradiction of functional characteristics: that between the extroversion of production function and introversion of living function;□ the contradiction of regional orientation: that between the production space near to streets and the living space far from streets; □ the contradiction in life structure: the juxtaposition of production and living function will certainly influence the quality in daily life, study and social contact of different family members.

Elastic interface: The gathering mode of residential construction based on mixed function is often variable due to different respective live-work demands (Richard, 1997). The stable part is generally the living space and such auxiliary space as kitchen and toilet while the variable part is the production space. Through functional recombination, the elastic work-live space can both solve the contradiction between space and utilization and indicate the multiple possibility of island residential development. Meanwhile, the possibility of improving variability is based on a complete system, such as building materials, construction and structure. However, island environment is different from land. Due to the relatively slow speed in residential development and comparatively more natural disasters, the action to implement elastic residence in large scale still remains in theoretical level (Table 3).

Mixed efficiency: Compared with the Ordinary construction, although the mixed live-work settlement needs higher investment, yet it can obtain more overall efficiency, richer complex function and more beneficial integration of energy efficiency more often than not. The dual live-work pattern is mutually interspersed, transited and permeated and it also depends on its elastic characteristics to realize the successful live-work paradigm of "1+1>2". Nevertheless, island residents are often overly concerned about this as marine industry suffers uncertainty caused by climate and geological influences; moreover, they also overlook the representation of living values or due to industrial demands, they pay excessive attention to outward forms and lack consideration about other deeper connotations, thus reducing the live-work balance into unbalance.

MANAGEMENT MECHANISM OF MIXED-USE SETTLEMENT

The island residential construction contains the content in such aspects as gathering point layout, functional division, facilities construction, industrial guidance and architectural diversity. In its development process, there are certainly some elements lost due to being ignored. On the other hand, the island settlement is not the functional and randomized industrial residence; therefore its construction process needs macroscopic system control and microscopic resident vitality for interaction and mutual promotion.

Infrastructure introduction: The construction of infrastructure is the key to giving full pay to island

residential live-work efficiency and its municipal foundation mainly covers various project systems, such as traffic, water supply, environmental sanitation, electricity supply, communication and precautions against natural calamities (Zhu, 2011). It thus includes: (1) Traffic construction: Aimed at the peculiarity of island geographical location, in terms of traffic construction it should appropriately arrange the cooperation of traffic system between villages and waterway, highway and ports and form reasonable traffic network with clear relationship between important and less ones; (2) Water supply and drainage: Most of island settlements face waters and the water supply system facilities should adjust to local conditions and take full advantage of island natural conditions while the water drainage system should give consideration to both ecology and development and it can establish the irrigation system or confluence precipitation system to prevent pollution; (3) Electricity project: According to the demands in power supply of villages it should combine with the actual situation and make necessary evaluation, so as to ensure the coordinated operation of live-work function.

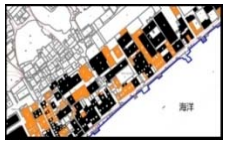
Establishment of module implement: In the development process of island settlement with mixed function, as the time sequence of construction and its purpose constantly change it often takes on a spatial disorder and functional hybridity and the reasonable functional configuration and spatial value are still in exploration. Based on the result of economic residential conversion and combining with the island residential construction scale, the study thus proposes multiple possibilities of combining different industries with settlement, in order to maximize the efficiency. Meanwhile, the paper also divides the house into two parts, namely, the supporting system and common space and it then employs the modular construction. The supporting system ensures the consistency of residence general style while the common space lays foundation for the applicability and implementation value of internal live-work model.

Imbedding heterogeneous space: The current organization with mixed function follows the coordinated and unified simple principle and law and the development of construction system that it forms is still in the development process of combining other-organization with self-organization. According to the classification of mixed function made by Alan (1998), heterogeneous model can be concluded into four dimensions, namely, timeliness mixed type, sharing mixed type, horizontality mixed type and verticality mixed type. The live-work mixed paradigm under these four dimensions possesses mutual adaptation and the mixed functional space reasonably coexists; moreover, there is the possibility for transformation. Based on this, new construction concepts as well as orders are employed to organize a complete system.

Land capacity optimization: In terms of land use ratio and spatial organization, as the regional form of island mixed-used settlement has no clear macroscopic planning which is mainly formed by self-organization of residents, such characteristics as low land capacity per unit and unreasonable spatial distribution are generated. In the rebuilding and re-planning process, residents should regard island industry as the center and employ spatial gathering system to promote the growth of regional economy. The first is to develop the "dotted" economy and establish island special industrial bases; the second is to develop the "linear" economy and form the industrial chain integrating fishing, aquaculture, processing, material supply and sales together; the third is to develop the "block" economy and to maximize land capacity with clear functional division and industrial process in the block. (Table 4)

Management mechanism improvement: In terms of management about island residential construction, government should regard market economy as the dominance and technical strategy as the supplementation and form the scientific and reasonable management

Table 4: Land capacity optimization (Take Zhoushan as an example)

Evolutionary	"Dotted" model	"Linear" model	"Block" model
Organizational model	Free scattering heterogeneousness	Orderly generating heterogeneousness	Spatial gathering heterogeneousness
Sample region	Madai County, Dinghai District	Daishan County, Dinghai District	Yugang, Shenjiamen
Land texture			
Capacity benefits	Diversified industry and lower benefits	Limited industry and increasing benefits	Large industrial popularity and optimized benefits

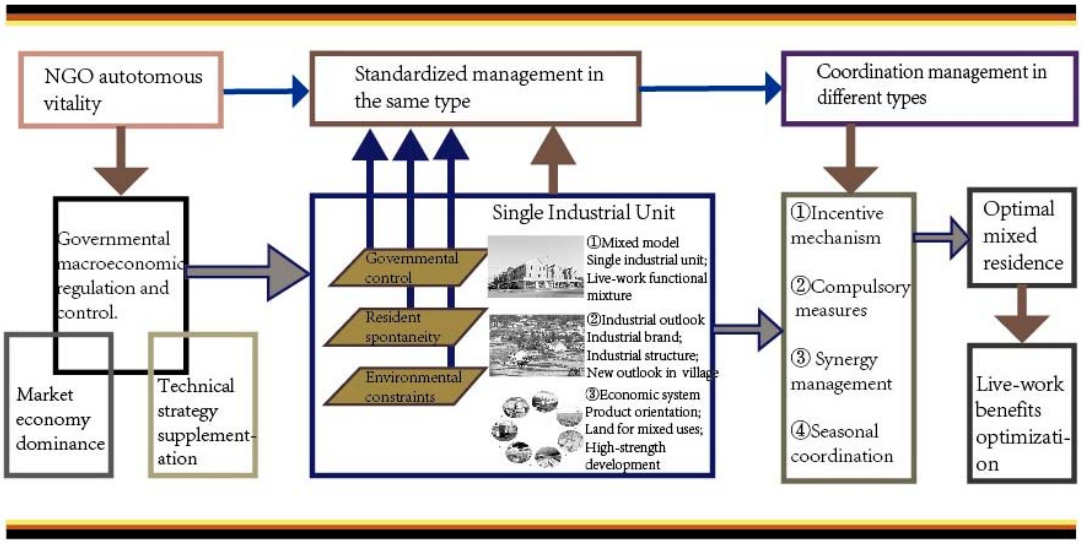


Fig. 1: Management mechanism improvement

system,thusrealizing gradual perfection of living environment and optimization as well as integration of operation mode. (Fig. 1).

CONCLUSION

The live-work mixed residential construction model is the effective measure to effectively use island resources, promote production benefits and enhance living quality. By combining with functional characteristics of heterogeneous space, due to the difference of Chinese and Western islands in industry, geography, culture and system, the agents and management measures of its mixed residential construction are different. In live-work relationship and spatial composition, there are differences in farmhouse type, industrial type, artistic type, market type and religious type island residential peculiarities and based on industrial diversity, different mixed house types provide characteristic experience. At the sanie time, based on mixed function, there are much gap in truly realizing such specialties as residential functional diversity, live-work synergy, model elasticity and mixed efficiency. In light of the specific management measures, such constructions proposed by the paper aimed at the island mixed-used settlement are also imperfect as the infrastructure introduction, implementation of modular concept, heterogeneous space synergy, land capacity optimization and management mechanism improvement. Therefore, this paper needs to make further exploration about regional mixed agents and combine with the actual situation to put forward mixed residential models suitable to local conditions according to conditional differences.

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